might be devised, based on absolute zero, which would be really decimal, have no minus readings and be in accordance with the metric system.

It is unfortunate, theoretically, at least, that the meter is not exactly a ten-millionth of the earth's quadrant. But the question with us in America is, shall we adopt as a unit the platinum-iridium bar in Paris, accurate copies of which are in all the national archives and the length of which is known in terms of the wave-length of light, or shall we continue to use as our unit a broken brass rod riveted in the middle which differs from everything else in creation.

Compound numbers, which to the French are known in ancient history, are to us a daily nuisance. They take up a good third of our arithmetics, by far the hardest third at that, and require about a year of a child's school life to learn even passably. If the 'English accountant' can add guineas, pounds, shillings, pence and farthings as rapidly as an American accountant can add dollars and cents, it must be because the greater difficulty of his task has caused a greater mental development. If Sir Frederick Bramwell can calculate by mental arithmetic how many grains of water there are in a gallon as quickly as a child can tell how many grams there are in a liter he is indeed a mathematician.

The requirements of scientific work are not so different from those of commerce as has been imagined. It is not a matter of indifference to the scientist whether his measures are capable of easy division. A chemist has to make more divisions into aliquot parts than a shopkeeper, as I know by personal experience in both capacities.

It is probable that the duodecimal notation would be preferable to the decimal, though it is not certain that it is the best that could be devised. Notations based on eight, sixteen and two have, I believe, been more favored by mathematicians than that based on twelve. The difficulties of a change are, however, almost inconceivable, perhaps as great as a change to a more perfect language would be, and it seems hardly worth while to take into consideration its possibility. The fact is that for the period intervening between that geological epoch when our saurian ancestor lost his sixth digit, to that perhaps equally remote date when men shall become intelligent enough to choose a better system of notation than the present, the world is doomed to a decimal system. Let us then make the best of it by bringing weights and measures in accordance with it and, instead of complaining, rather be thankful that the first human arithmetician had five fingers instead of seven, since he did not have the happy medium. It seems that the English, in spite of their national genius for devising incommensurable units, are moving as fast in the matter of adopting a better system of weights and measures as the Americans, and we may put faith even in the prophecy made by Matthew Arnold in one of his optimistic moods, that the time will yet come in England when the fact that an institution is an anomaly will be regarded as an objection, not an advantage.

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THE USE OF THE HAIR HYGROMETER.

For some time past there has been an increasing demand for a direct reading hygrometer, so constructed that it would indicate the relative humidity of the air with reasonable accuracy.

Among those hygrometers which have been considered as possibly suitable for this purpose is the Saussure's or hair hygrometer. Although formerly this hygrometer was looked upon merely as a hygroscope, and was supposed to give only the approximate hygrometric state of the air,

now it has reached a higher place among hygrometrical apparatus by virtue of certain improvements in its construction.

I have recently tested a form of hygrometer based on the Saussure principle, with a view of observing its action when subjected to different changes in the degree of saturation of the air.

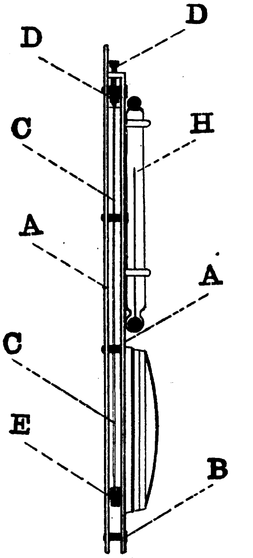

FIG. 1.

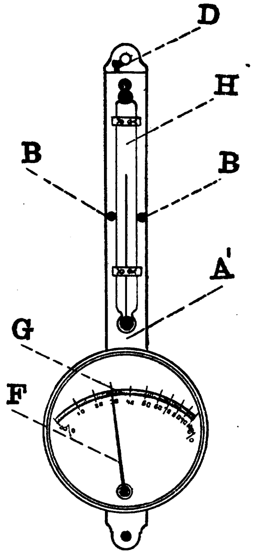

FIG. 2.

The hygrometer which was tested is shown in the accompanying cut, Figs. I. and II.; the essential parts of the instrument are designated by letters, and the parts so indicated are explained in the following paragraph :

A and A′ are two thin brass supports, respectively 23.7 centimeters and 22 centimeters long and 2 centimeters broad.

B, small rivets which connect the supports A and A′, but leave an air space which separates the latter by .7 of a centimeter.

C, six fine hairs about 18 centimeters long, placed parallel, and laid close together, so as to hang like one large hair in the air space between A and A′.

D, an adjusting screw, from which the six hairs, C, are suspended.

E, a short lever, to which the lower ends of the hairs, C, are fastened (a small weight is attached to this lever in such a way that the hairs are kept at a slight tension).

F, an indicator, 4 .7 centimeters long, fastened to the lever, E, which shows changes in the length of the hairs, C ; by the use of this indicator the actual change in the length of the hairs is multiplied a convenient number of times.

G, a scale of percentages of relative humidities, from 0 to 100 per cent.

H, a thermometer fastened to the support A′, which is used in dew-point determinations.

It was important that the scale of percentages, G, Fig. II., should be carefully tested and either verified or the corrections obtained throughout; therefore observations were made with all possible different percentages of saturation of the surrounding air.

The readings of the air hygrometers in each case were compared with the relative humidity obtained from observations made with wet and dry bulb thermometers, and the percentage of saturation deduced from the Smithsonian hygrometrical tables of Guyot. This was done as a relative comparison, since the wet and dry bulb thermometers, or Auguste's psychrometer, is the means almost entirely used at the U. S. Weather Bureau stations for obtaining the relative humidity of the air.

Of course, in the present investigation, the determinations made with the wet and dry bulb thermometers were themselves subject to some error ; yet this method is so generally accepted, and is the means which is so often used for obtaining the relative humidity, that it seemed fair to compare the readings of the hair hygrometer with those calculated from observations made with wet and dry bulb thermometers.

The results of the comparisons which were obtained indicated that for the middle

section of the instrument under consideration, say from 20 to 85 per cent., only a difference of from one to three per cent. could be observed.

But for the extremities of the scale, from 0 to about 20 per cent. and from about 85 to 100 per cent, the reading indicating the relative humidity seemed unreliable, and especially so at low humidities, differing in some cases as much as 10 per cent. from the calculated degree of saturation.

Thus, in cases of either very low or very high humidity, when two or more hair hygrometers were placed in the same atmosphere, their readings were very apt to indicate different relative humidities, and also when the same hair hygrometer was placed at different times in an atmosphere of a constant hygrometric state (of either very low or very high relative humidity) it gave different percentages.

These variations of course presented a difficulty in drawing a correction curve for the extremities of the scale on the hair hygrometer.

Prof. Rood called my attention to an article in the *Beiblätter zu den Annalen der Physik und Chemie*, Vol. 19, No. 11, page 875—'Theorie des Haarhygrometers, by B. Sresnevsky,' in which it is stated that the change in the length of the hairs for degrees of saturation of the air ceases to be regular when the relative humidity becomes as low as 7.8 per cent. This is in agreement with the statements just made.

In the tests which were carried on, it was also invariably found that if the degree of saturation of the air was altered, some time had to elapse before the hairs became adjusted to the new conditions surrounding them, and therefore ample time was always given for the hairs to become adjusted when the hygrometric state of the air was changed. Thus, when the hair hygrometers were placed in an entirely new atmosphere differing 15 per cent. or more in relative humidity, 5 to 25 minutes elapsed before the hairs responded perfectly to the change and gave approximately correct readings. It was further observed that the length of this time depended on whether the change was to a higher or to a lower percentage of humidity, and also in what part of the scale the change occurred.

For example: A change from

15 to 90	per cent.	required	about 10	minutes
30 to 90	"	"	" 10	"
15 to 30	"	"	" 15	"
90 to 15	"	"	" 20	"
90 to 30	"	"	10 to 15	"
30 to 15	"	"	about 20	"

which indicated that it takes longer for the hairs to dry out than for them to take up the moisture, and that the change is slower at the lower parts of the scale than elsewhere.

A knowledge of the relative humidity of the air is important, not only in various branches of science and the arts, but also in the treatment of the sick, particularly in cases of certain pulmonary disorders.

Although it may be probable that a perfectly accurate direct reading hygrometer cannot be obtained, this drawback should not condemn the hair hygrometer, for such great exactness is seldom required, a knowledge of the relative humidity of the air to within two or three per cent. being, in most cases, all that is necessary.

The precaution of allowing considerable time to elapse for the hairs of hair hygrometers to become adjusted to a changed atmosphere, before taking a reading, is only really necessary where a possibility exists that a decided change in the relative humidity has suddenly occurred.

The table which is given below has been constructed from results obtained by comparing the readings of relative humidity shown by the hair hygrometer with those calculated from observations made with wet

and dry bulb thermometers, and it is meant to exhibit the amount of error to be expected when the former is compared with the latter in different parts of the scale.

Sections of Scale of Percentage.	Probable Limit of Error.	Error Ordinarily to be Expected.
0— - 10 %	10 %	From 0 to + 6 %
10— - 20 "	6 "	" 0 " + 4 "
20— - 30 "	4 "	± 3 "
30— - 40 "	3 "	± 2 "
40— - 50 "	2 "	± 1 "
50— - 60 "	3 "	± 2 "
60— - 70 "	3 "	± 2 "
70— - 80 "	4 "	± 3 "
80— - 90 "	4 "	± 3 "
90— -100 "	7 "	From 0 to — 5 "

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INSTRUCTION IN NATURAL HISTORY AT THE JARDIN DES PLANTES, PARIS.

IT has been my good fortune to have spent the past winter in carrying on investigations in the paleontological laboratory of the Jardin des Plantes, Paris, and while there I took the opportunity to study the methods of instruction at the Muséum D'Histoire Naturelle. I am especially indebted to MM. Albert Gaudry, Alphonse Milne-Edwards, Henri Filhol and Marcellin Boule. These gentlemen have placed exceedingly valuable material in my hands for study, and I am greatly obliged to them all for their extreme kindness during my stay in Paris.

The instruction at the Jardin des Plantes consists of the 'cours' or lectures, the 'conférences' or practical work in the laboratory, and the 'enseignements specials' or special instruction, generally for the benefit of travelling naturalists. During the year there have been eighteen courses of lectures on various scientific subjects, eleven of which were biological, the remaining being on agriculture, physics, geology, etc. Some of the subjects treated of by the professors are certainly not intimately connected with natural history, but we must remember that the Jardin des Plantes was previously founded as a school of pharmacy, and in connction with the same there was a large garden for the cultivation of plants for medical purposes. It was not until 1793 that the reorganization of the Jardin des Plantes took place and regular courses of public lectures were opened. It is interesting to note that in this year two brilliant men were added to the faculty of the 'Jardin;' these were the Chevalier de Lamarck and the young Etienne Geoffroy Saint-Hilaire. The latter commenced a course of lectures at this time, and later in 1798 accompanied Napoleon on his Egyptian expedition, as naturalist.

As a rule almost all of the naturalists who have held professorships in the Jardin des Plantes have been men of broad learning and have worked in many fields of biology. This is noticeable in the public lectures given at the 'Jardin,' and I can safely say that even the systematists are well grounded in comparative anatomy. When we consider that the French naturalists have had so great a teacher as Georges Cuvier to follow, it is not strange that the professors at the Muséum D' Histoire Naturelle fully appreciate the fact that the curators, etc., of the Muséum who lecture should be well grounded in the morphological relation of animals.

The numerous lectures on biology given at the Muséum D' Histoire Naturelle are in strong contrast with the few that are held in other natural history museums of the world. The lecture hall of the British Natural History Museum has been given up entirely and there are no lectures now given in this institution. In fact, it is a great question with the trustees of some museums whether a natural history museum is a place for teaching at all or simply a great store-house, in which vast accumulation of specimens are preserved, labelled and placed by the hundreds in glass cases for